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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/636,134 08/10/00 BALOOCH

M IL-9940B

EXAMINER

IM52/0924

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BUCKER, R
ART UNIT

PAPER NUMBER

6

1763
DATE MAILED:

09/24/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/636,134

Applicant(s)

Balouch et al.

Examiner

R. Bueker

Group Art Unit

1763

—The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address—

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE three MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- ☒ Responsive to communication(s) filed on 7-2-01
- ☐ This action is **FINAL**.
- ☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- ☒ Claim(s) 1, 9-30 is/are pending in the application.
- Of the above claim(s) _____ is/are withdrawn from consideration.
- ☐ Claim(s) _____ is/are allowed.
- ☒ Claim(s) 1, 9-30 is/are rejected.
- ☐ Claim(s) _____ is/are objected to.
- ☐ Claim(s) _____ are subject to restriction or election requirement

Application Papers

- ☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.
- ☐ The drawing(s) filed on _____ is/are objected to by the Examiner
- ☐ The specification is objected to by the Examiner.
- ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119 (a)-(d)

- ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119 (a)-(d).
- ☐ All ☐ Some* ☐ None of the:
- ☐ Certified copies of the priority documents have been received.
- ☐ Certified copies of the priority documents have been received in Application No. _____
- ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a))

*Certified copies not received: _____

Attachment(s)

- ☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____
- ☐ Interview Summary, PTO-413
- ☐ Notice of Reference(s) Cited, PTO-892
- ☐ Notice of Informal Patent Application, PTO-152
- ☐ Notice of Draftsperson's Patent Drawing Review, PTO-948
- ☐ Other _____

Office Action Summary

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On September 17, 2001, the examiner talked by telephone with applicants' attorney, Mr. Carnahan, regarding the possibility of providing an affidavit similar to that filed in the parent application, and amending the claims to describe the claimed laser ablation target in a manner similar to that of the parent. These preliminary discussions did not result in any agreement being reached.

Claim 26 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The claim 26 limitation of a target composed of alkali meta appears to be new matter

Claims 19-30 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The phrases "low work function" and "short wavelength photons" represent relative terms without clear metes and bounds, which render the claims vague and indefinite. Applicants' specification at page 2, lines 1-4, describes low work function materials as having a work function of approximately 1 electron volt, and refers to a book by Fomenko et al. As containing a list materials having a work function of approximately 1 eV. To clarify what applicants regard as their invention, and to advance the prosecution of this application, applicants are hereby requested to provide a photocopy of this list of materials from the referenced book, showing the materials that applicants consider to be low work function materials of approximately

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1 eV. Claim 28 is vague and indefinite because it recites that the holding means is tilted at an angle of 0 to 90 degrees but fails to state what the angle is with respect to. It should also state that the angle is chosen from the stated range of angles.

Claims 19-30 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claim 19 recites a step of controlling the composition by controlling the temperature of the target. The specification, however, does not contain an explanation of exactly how to control the composition of a deposited film by controlling the target temperature. While the specification states that the temperature of the target can be varied over a wide temperature range, there is no indication of how this would affect the coating composition. One skilled in the art could only speculate or guess what applicants intended by this claimed limitation. Regarding claim 26, the specification does not provide any enabling disclosure for laser ablation of a target composed of "an alkali metal" as recited in claim 26. The specification also does not provide any enabling disclosure for laser ablation of a target containing low work function material, wherein the target is composed of barium metal oxide. The only working example of a target composition in applicants' specification is barium oxide doped in SiO₂ (page 9, lines 11-23). As noted in the attached dictionary definition, silicon is a nonmetallic element. Therefore, barium oxide doped SiO₂ does not qualify as a barium metal oxide, and does not provide any guidance to one skilled in

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the art for determining what material applicants were intending by the claimed recitation of a barium metal oxide.

Claims 19, 21-22, 24-27 and 29-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Russo (5,432,151) in view of Chrisey (Pulsed Laser Deposition of Thin Films, pp. 42-43, 294, 456 and 262-263) and in further view of Face (5,389,606), Koga (5,897,790), Gartner (5,866,975) Gartner (5,254,832) or Mehrotra (6,007,399). Russo illustrates a conventional laser ablation apparatus wherein a vacuum chamber having a window is provided with an excimer laser, for ablating a barium metal oxide target to deposit a coating on a substrate. Chrisey provides further description of conventional laser ablation apparatus of the type used by Russo. Chrisey shows that it was conventional in the prior art to rotate the substrate and to control the substrate temperature. Each of the tertiary references (Face, Koga, Gartner, Gartner, or Mehrotra) discloses a laser ablation process for depositing a low work function coating by using a target containing a low work function material, such as a barium metal oxide target as claimed by applicants. Face, for example, (see col. 6, lines 9-12 and 59-64, and col. 7, Lines 29-31) teaches that BaO, CaO and CuO coatings can be deposited by laser ablation from targets made of these same materials. . It would have been prima facie obvious to one skilled in the art to practice the processes of the tertiary references for depositing low work function coating, by using a conventional laser ablation apparatus having the features described by Russo and Chrisey. Regarding Koga, see col. 5, lines 36-52; col. 8, lines 53-57; col. 10, lines 55-65; col. 17, lines 52-66; col. 19, lines 3-6; col 20, lines 33-67; col. 22, lines 29-31 and col. 23, lines 28-48. Regarding

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Gartner (5,866,975), see col. 6, lines 34-40 and 55-67, and col. 7, lines 1-24. Regarding Gartner (5,254,832), see Fig. 2. Regarding Mehrotra, see col. 3, lines 30-51.

Claims 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references cited in the rejection of claim 19 above, taken in further view of Cotell, who teaches (col. 5, lines 52-68) that it is desirable to provide a laser ablation apparatus with an ion beam means for the purpose of precleaning a substrate prior to conducting a laser ablation process. It would have been obvious to provide a ion gun of the type taught by Cotell in the apparatus described by Russo and/or Chrisey, for the desirable purpose of precleaning a substrate prior to laser ablation. It is noted also that the ion gun describes by Cotell can also properly be considered a "gas generator" as claimed in claim 24, because it generates ionized gas.

Claims 20 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references cited in the rejection of claim 19 above, taken in further view of Moto, Cotell and Face (5,389,606). Moto (col. 5, lines ²⁵⁻³⁹40-58) teaches that it is desirable to provide a laser ablation apparatus with means to rotate and tilt a substrate during laser ablation. In view of the teachings of Moto, it would have been prima facie obvious to enhance the laser ablation apparatus of Russo and/or Chrisey by providing it with additional means to tilt the substrate. Face also teaches the use of a substrate cooling means (col. 8, lines 3-5 and 28-29). The ability to cool a substrate as taught by Face would be inherent in any laser ablation apparatus having a heated substrate, or it would have at least been obvious to provide this feature in view of Face. Also, Cotell discloses ion beam means for processing the surface of a substrate.

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Applicants' arguments contained in their response have been considered but are not persuasive. Applicants have argued that neither Russo nor Chrisey teach means for controlling the composition of the deposit as claimed. It is noted, however, that all the laser ablation references cited recognize that the particular target composition used has a controlling effect on the composition of the coating that is deposited. Also, as noted in applicants' own comments, the claimed limitation of "means for controlling the environment of the deposition chamber" may be broadly considered to as the gas inlet and evacuation port of a vacuum chamber such as Russo's chamber. It would have been obvious to one skilled in the art to control the inlet and outlet of a laser ablation chamber such as Russo's. It is noted also that the reference to controlling the environment of the chamber is broad enough to include such factors as the substrate temperature, which would have been obvious from the cited references. Regarding the energy fluence of claim 30, Russo teaches this at col. 5, lines 25-34. The rotation speeds of the target and substrate are prima facie obvious. All of the cited references disclose means for processing the surface of a substrate, including Cotell, who teaches ion beam cleaning of the surface of a substrate as disclosed in applicants' specification.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard Bueker whose telephone number is (703) 308-1895.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Richard Bueker
RICHARD BUEKER
PRIMARY EXAMINER
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